

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification⁵ :

E04H 4/16

A1

(11) International Publication Number:

WO 91/09193

(43) International Publication Date:

27 June 1991 (27.06.91)

(21) International Application Number: PCT/AU90/00594

(22) International Filing Date: 18 December 1990 (18.12.90)

(30) Priority data:

PJ 7956

20 December 1989 (20.12.89) AU

(71)(72) Applicant and Inventor: MORIARTY, John, Barry
[AU/AU]; Unit 1, 15 Carrathool Place, Mooloolaba,
QLD 4557 (AU).(74) Agent: SMITH SHELSTON BEADLE; 8/207 Great
North Road, Five Dock, NSW 2046 (AU).

(81) Designated States: AU, US.

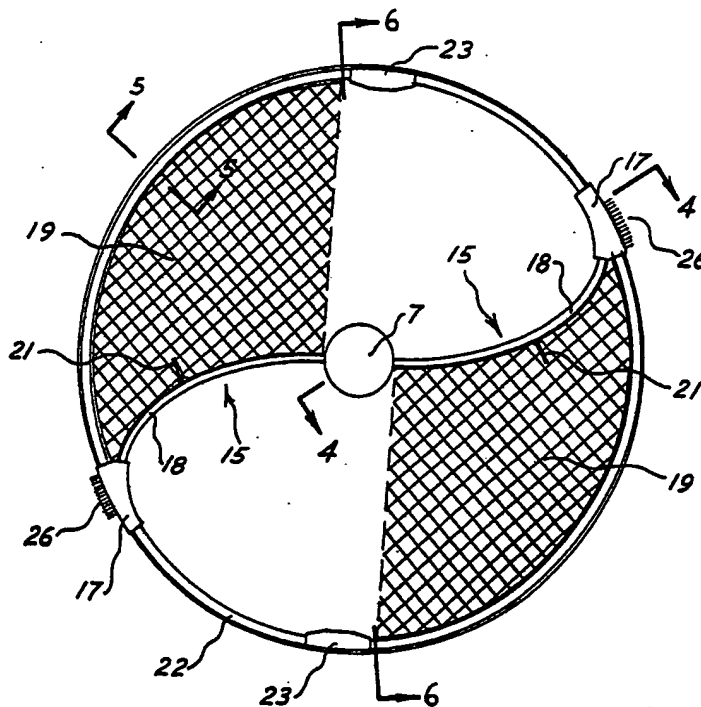
Published

With international search report.

(54) Title: FLOATING DEBRIS COLLECTOR

(57) Abstract

A collector for floating debris comprises a central hub (7) with two generally radially extending arms (15). Each arm comprises two tubular portions (18, 16) spaced one above the other so that one portion (18) is above the water surface and the other (16) below the surface. A seine type net (19) is supported by each arm with an above water part of its mouth secured to the upper arm portion and a below water part of its mouth secured to the lower arm portion. A filter return water supply hose (14) is connected to the underneath centre of the hub by way of a swivel connection (10, 11, 13) incorporating a propulsion jet nozzle (12). The hose also feeds into the tubular lower arm portion which is fitted with further jet nozzles (21) directed so as to cause the collector to rotate so that the nets sweep across the water surface.



FLOATING DEBRIS COLLECTORTECHNICAL FIELD

5 This invention relates to domestic and communal swimming pools and provides apparatus for the removal of floating debris, such as leaves, from the surfaces of such pools.

BACKGROUND ART

10 It is well known to draw water from swimming pools for filtering by way of a so-called skimmer-box. The skimmer-box usually comprises a small well adjacent the pool communicating with the pool through an opening furnished with a hinged weir. Water flows from the pool over the weir into the well and is drawn from the well for delivery to the filter. The effect of the weir is
15 to ensure that only a thin surface layer of pool water enters the well so that surface contaminants, such as dust and like floating particulate matter, are efficiently collected for despatch to the filter. Larger debris, such as leaves, also collects on the
20 water surface and is drawn into the skimmer-box. Such debris would soon clog the filter and the skimmer-box well usually houses a basket to trap it. Sometimes the basket soon becomes lined with such debris and, unless emptied and cleaned, obstructs the flow of water, so
25 reducing the efficiency of the filtering operation.

30 It has been proposed to trap such debris by means of a net held so that its mouth coincides with the water surface. One such proposal is shown in the complete specification of Australian patent application No.60530/86 in the name of E.I.Baitz wherein the net is stationary relative to the pool sides. It is also known to provide various items of pool apparatus including

self propelled floats, for example the pool floor
cleaning apparatus described in the complete
specification of Australian patent application
No.39756/85 in the name of Telpower (Proprietary)
5 Limited, but hitherto there has been no proposal for
self-propelled floating debris collectors.

DISCLOSURE OF INVENTION

10 An object of the present invention is to provide
simple self-propelled means for removing floating debris
from the surface of a swimming pool, of greater
effectiveness than the prior known stationary apparatus
for that purpose.

15 The invention consists in a self-propelled floating
debris collector comprising a supporting structure
adapted to float in a swimming pool, hose connection
means on said structure for the connection thereto of a
water supply hose, at least one open mouthed, perforate
scoop supported by said structure with its mouth partly
above and partly below the pool water surface, and jet
20 means carried by said structure and in communication
with said connection means; said jet means being such
that water flowing therefrom causes the collector to
move about the pool and the scoop to sweep the water
surface.

25 In preferred embodiments the jet means also cause
the collector to rotate about an upright axis so as to
enhance the sweeping movement of the scoop or scoops
upon the water surface.

30 The term "perforate", as used herein in relation to
a scoop, means that the walls of the scoop are pierced
by a multiplicity of openings through which water may
readily flow, but which are small enough to ensure that

any of the debris to be collected which enters the scoop is retained therein. In the case of a rigid scoop it may be a plastics moulding having walls in the nature, for example, of a grid or reticulation of intersecting ribs; alternatively it may be formed from woven wire mesh. However, in preferred embodiments, the scoop is an open weave net of plastics or textile filaments secured to, and trailing from, a portion of the collector's supporting structure defining the mouth of the scoop.

In preferred embodiments there is a plurality of scoops having elongated mouths extending generally radially from a central hub. The hose connector is on said hub and the jet means comprise nozzles or other outlets positioned such that water issuing therefrom causes the collector to rotate about the hub (to sweep the scoops across the water surface) and, at the same time, to move bodily and randomly about the pool water surface.

BRIEF DESCRIPTION OF THE DRAWINGS

By way of example an embodiment of the above-described invention is described in more detail hereinafter with reference to the accompanying drawings.

Figure 1 is a plan view of a debris collector according to the invention.

Figure 2 is a side elevation of the collector of figure 1.

Figure 3 is a perspective view from below of the collector of figure 1 drawn to a smaller scale, and with its scoops omitted.

Figure 4 is a sectional view taken on line 4-4 of figure 1, drawn to a larger scale, and with its scoops omitted.

5 Figure 5 is an exploded sectional view taken on line 5-5 of figure 1, drawn to a still larger scale.

Figure 6 is a sectional view taken on line 6-6 of figure 1, drawn to different larger scale.

BEST MODE OF CARRYING OUT THE INVENTION

10 The illustrated embodiment has a supporting structure comprising a central hub 7, being a generally cylindrical float enclosing a pipe T-joint 8 with the stem of the "T" extending downwardly towards the centre of the bottom of the float and the cross-bar of the "T" extending horizontally a little below water level 9.
15 That hub 7 may be a mass of expanded plastics foam, for example polystyrene foam, preferably with a protective and/or decorative surface skin or cover, adapted to function as a float.

20 The bottom end of the stem is furnished with hose connection means incorporating a swivelling propulsion jet nozzle. Those connection means comprise a conventional swivelling hose connector 10, a T-piece 11 with a jet nozzle 12 projecting therefrom, and a second swivelling hose connector 13 whereby a pliable
25 water supply hose 14 may be connected to the collector, while leaving the collector free to rotate about the stem as axis. That supply hose 14 may conveniently be, or be connected to, the return line from the pool filter.

30 Water issuing from the propulsion jet nozzle 12 causes the collector to move bodily on the water

surface. The presence of the swivels 10 and 13 permits the nozzle 12 to swing freely; thus the direction of collector movement is random. Furthermore, if the collector should become caught in a corner of the pool, the nozzle soon swings into a direction such that the collector is urged out of the corner.

Two oppositely curved scoop support arms 15 extend from the hub 7 so that the hub and arms appear in the shape of a letter S when viewed from above.

More specifically described, the cross-bar of the T-joint 8 is extended in both directions beyond the hub 7 by a rigid pipe, in this instance of hexagonal cross-section, constituting two oppositely curved, tubular, outwardly extending lower arm portions 16 disposed, in use, slightly below the water surface 9. The end of each arm portion 16 remote from the hub 7 is embedded in a foam plastics junction block 17. Each support arm 15 also comprises an upper arm portion 18 extending from the respective junction blocks 17 to the hub 7, preferably in a curve corresponding to and overlying the respective lower portions 16. The upper arm portions 18 are disposed slightly above the water surface 9.

A scoop in the form of a seine-like net 19 is secured to each support arm 15. In the present instance the edges of the nets 19 are secured to the support arms by virtue of resilient edge beads on the net being lodged within grooves formed in the support arm tubes. In other embodiments the mouth of each net may be defined by a return hem which is sleeved upon the tubes of the corresponding support arm. In either instance the upper edge of the net's mouth is above water and the lower edge below water with the main pocket of the net trailing behind the convex side of its support arm.

The lower arm portions 16 are adapted to conduct water from the hose to propulsion jet outlets, which may or may not be furnished with nozzles 21, formed in those arm portions. The illustrated jet nozzles 21 are symmetrically disposed about the upright axis of the hub 7 and thus produce pure rotation of the collector as a whole, but in other embodiments a propelling jet nozzle, such as nozzle 12, may be omitted, and the arm jet outlets arranged non-symmetrically so that, as well as producing a turning moment tending to cause rotation of the collector about the axis of the T-joint stem, they also create a resultant off-centre propulsive force tending to cause the collector as a whole to move about the pool. For example, one arm may have a single jet outlet near its radially outer end directed away from its convex side and the other arm may have two similarly directed jet outlets closer to the hub.

For preference a peripheral ring 22 extends through and is supported by the junction blocks 17. That ring may be of the same cross-section as the arm portions 16 and 18. Its purpose is twofold. It carries outrigger, plastics foam or other floats 23 which stabilise the collector as a whole, and by means of a key strip 24 similar to the edge beads 20 lodged in grooves in the ring 22 support rear portions of the nets 19 above the water line. For preference a rubber or other hard wearing buffer strip 25 extends around the ring 22.

For preference, each junction block 17 carries a brush 26 or other scrubbing means on its outer surface so that, when the collector is near the sides of the pool, the pool wall is scrubbed clean along the waterline. The brushes or their equivalents are preferably detachably secured to the collector to facilitate their replacement when they become worn through protracted use. Above water jets may also be

provided at or near the arm ends to play on the pool wall above the waterline to enhance the wall cleaning action.

5 It will be apparent to those skilled in the art that considerable variation in design details could be made in the exemplary embodiment without departing from the scope of the invention. For example, as described the main sweeping action is occasioned by the rotation of the collector, but in other embodiments the forward movement of the collector may be solely relied upon. 10 This applies particularly to collectors having only one scoop. In rotary embodiments, the number of scoops may be increased from two if desired, with the scoops then preferably equi-angularly disposed about the axis of rotation, the ring 22 may be replaced by arms extending 15 as spokes from the hub with stabilising floats at their outer ends, and so on.

CLAIMS

1. A self-propelled floating debris collector comprising a supporting structure (7,15) adapted to float in a swimming pool, hose connection means (10,11,13) on said structure for the connection thereto of a water supply hose (14), at least one open mouthed, perforate scoop (19) supported by said structure with its mouth partly above and partly below the pool water surface (9), and jet means (12,21) carried by said structure and in communication with said connection means; said jet means being such that water flowing therefrom causes the collector to move about the pool and the scoop to sweep the water surface.

2. A collector according to claim 1 wherein said jet means further cause the collector to rotate about a central upright axis.

3. A collector according to claim 2 wherein said supporting structure comprises a central hub (7) providing flotation for the collector and a plurality of equi-angularly spaced support arms (15) extending from said hub and each supporting a said scoop (19).

4. A collector according to claim 3 wherein each said support arm comprises an upper portion (18) and a lower portion (16) and the scoop supported by said each arm comprises a net with an above water part of its mouth secured to said upper portion and a below water part of its mouth secured to said lower portion.

5. A collector according to claim 3 wherein said jet means comprise an outlet (21) on at least one of said arms.

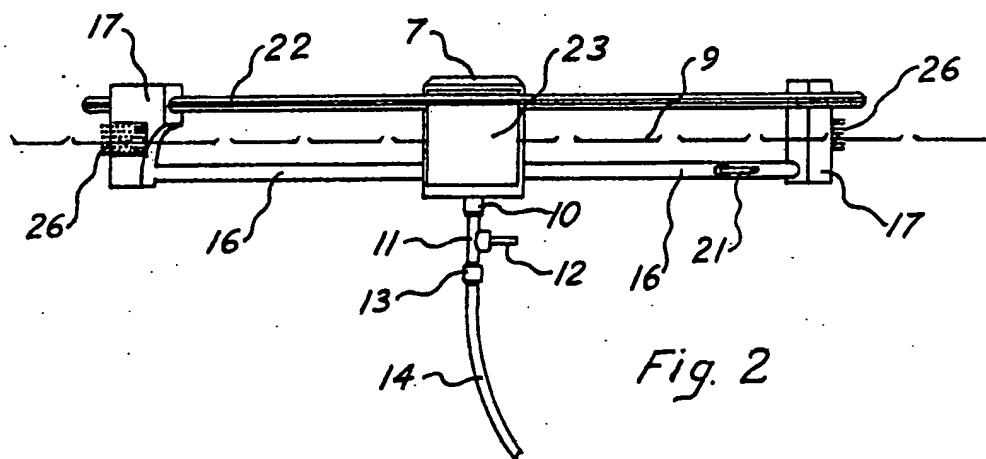
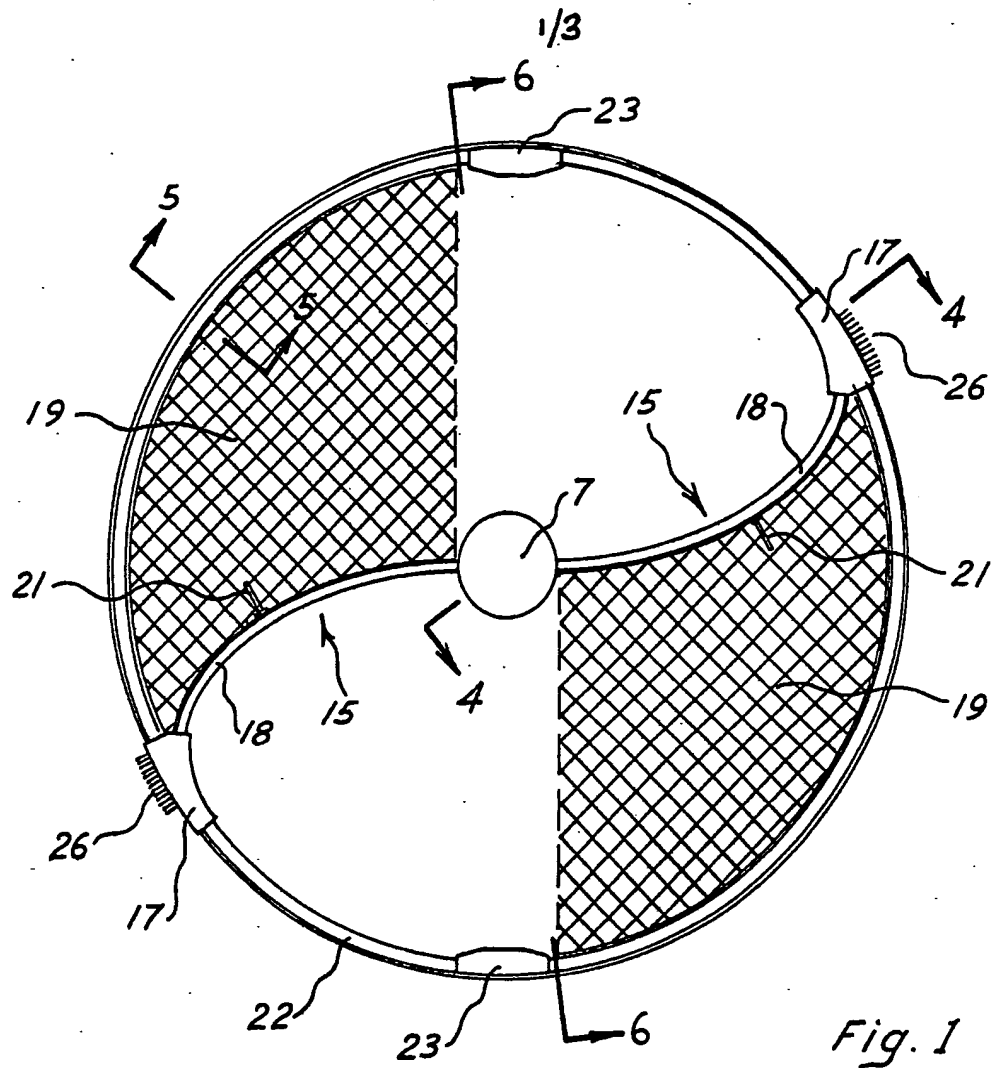
6. A collector according to claim 5 wherein said jet means further comprise a second outlet (12) associated with said connection means.

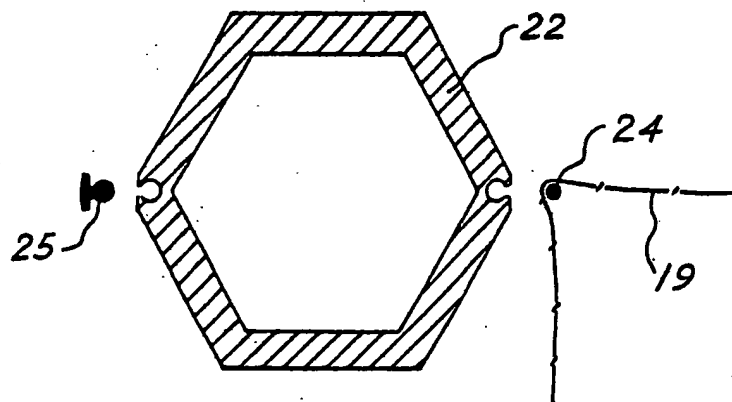
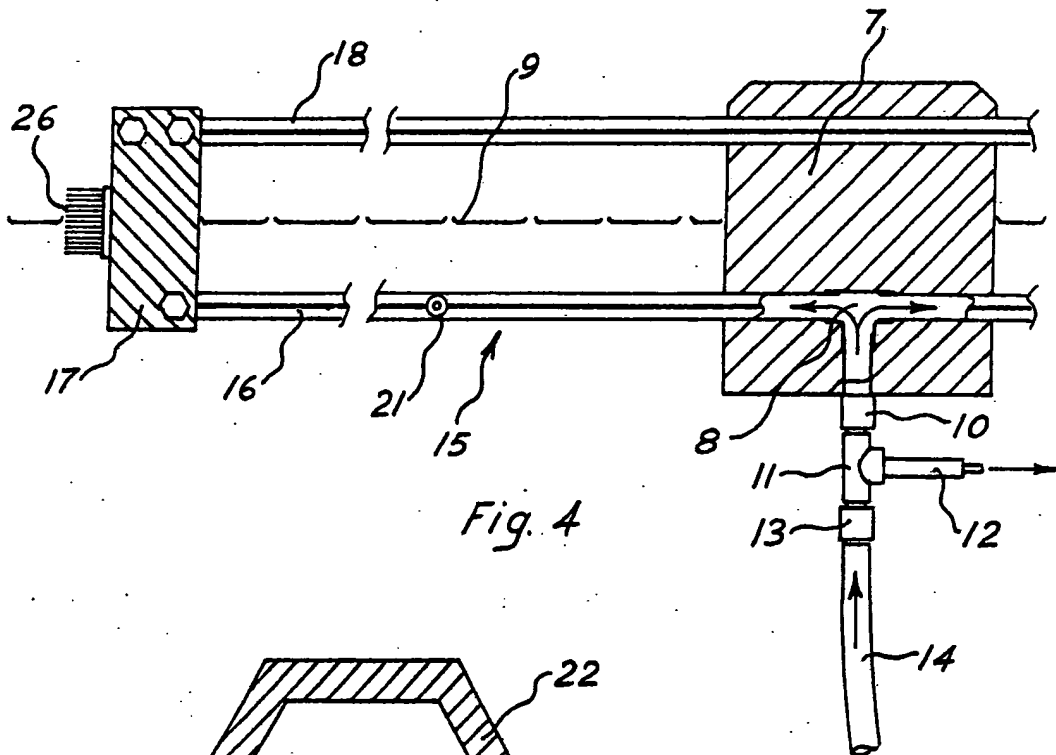
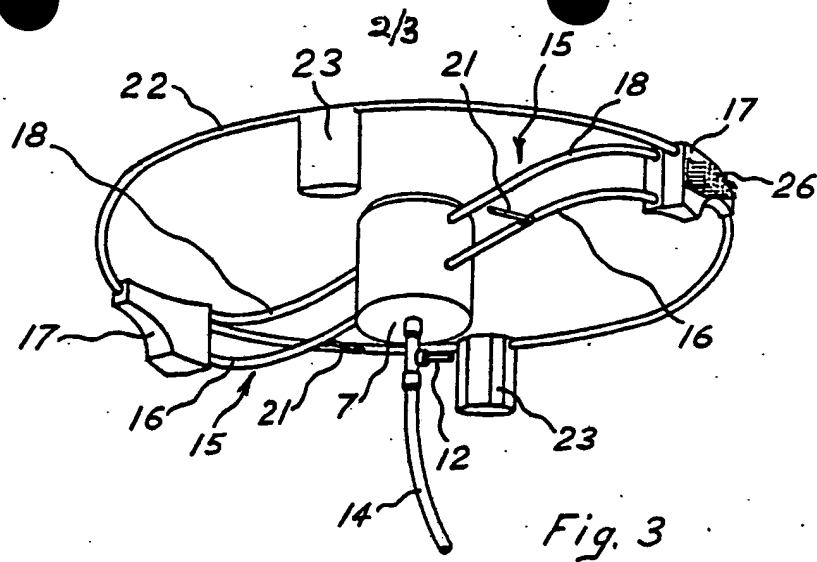
5 7. A collector according to claim 2 wherein said supporting structure further comprises outrigger floats (23) radially spaced from said hub.

8. A collector according to claim 2 furnished with wiper means (26) adapted to scrub walls of the pool as the collector rotates thereagainst.

10 9. A collector according to claim 7 wherein said supporting structure further comprises a peripheral ring (22) secured to the outer ends of said arms and wherein said outrigger floats are borne by said ring.

15 10. A floating debris collector substantially as described herein with reference to the accompanying drawings.





3/3

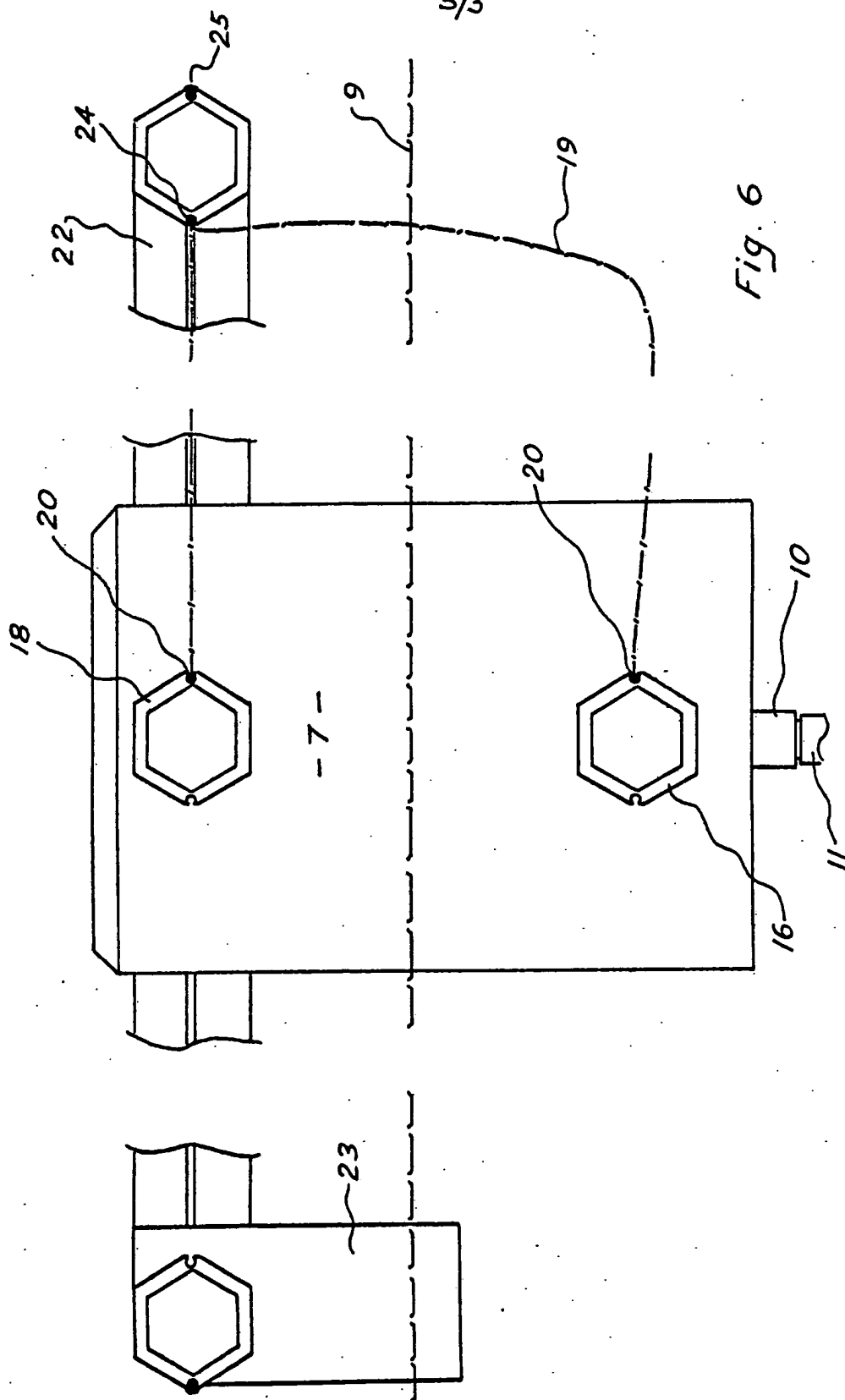


Fig. 6

INTERNATIONAL SEARCH REPORT

International Classification No. **PCT/AU 90/00594**

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) 6		
According to International Patent Classification (IPC) or to both National Classification and IPC		
Int. Cl. ⁵ E04H 4/16		
II. FIELDS SEARCHED		
Minimum Documentation Searched 7		
Classification System	Classification Symbols	
IPC	E04H 4/16 , E04H 3/20	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched 8		
AU : IPC as above		
III. DOCUMENTS CONSIDERED TO BE RELEVANT 9		
Category*	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages 12	Relevant to Claim No 13
A	US,A, 4503874 (NORTON) 12 March 1985 (12.03.85)	
A	US,A, 3665942 (MOORE) 30 May 1972 (30.05.72)	
A	US,A, 4105557 (WEATHERHOLT) 8 August 1978 (08.08.78)	
A	US,A, 3932281 (PANSINI) 13 January 1976 (13.01.76)	
A	US,A, 4746424 (DREW) 24 May 1988 (24.05.88)	
A	AU,B, 39756/85 (552538) (TEPOWER PROPRIETARY LIMITED) 19 September 1985 (19.09.85)	
<p>* Special categories of cited documents: 10</p> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 45%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"G" document member of the same patent family</p> </div> </div>		
IV. CERTIFICATION		
Date of the Actual Completion of the International Search 4 March 1991 (04.03.91)	Date of Mailing of this International Search Report 12 March 1991	
International Searching Authority Australian Patent Office	Signature of Authorized Officer M.G. KRAEFTT <i>M. G. Kraefft</i>	

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON
INTERNATIONAL APPLICATION NO. PCT/AU 90/00594

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Members			
US	4503874				
US	3665942	AU 48898/72 DE 2255784	CA 973314 GB 1373456	CH 558865 ZA 7208166	
US	4105557				
US	3932281				
US	4746424				
AU	39756/85	AU 49967/85 EP 182447 ES 552868 US 4703955 ZA 8508464	AU 54244/86 ES 541163 ES 8701887 US 4839063 US 4776954	EP 155170 ES 8607067 US 4652366 ZA 8501696 US 4778599	

END OF ANNEX